Kramer Electronics, Ltd.

USER MANUAL

Models:

TP-581T, ***HDMI Line Transmitter***

TP-582T, ***HDMI Switcher/Line Transmitter***

TP-582R, ***HDMI Line Receiver DA***

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer MegaTOOLS® **TP-581T** *HDMI Line Transmitter,* **TP-582T** *HDMI Switcher/Line Transmitter* or **TP-582R** *HDMI Line Receiver DA* that are ideal for:

- Home theater, presentation and multimedia applications
- Rental and staging

The package includes the following:

- **TP-581T** and/or **TP-582T** and/or **TP-582R**
- Power supply (5V DC)
- IR remote control transmitter (for **TP-582T** only)
- This user manual[2]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high-performance high-resolution cables[3]

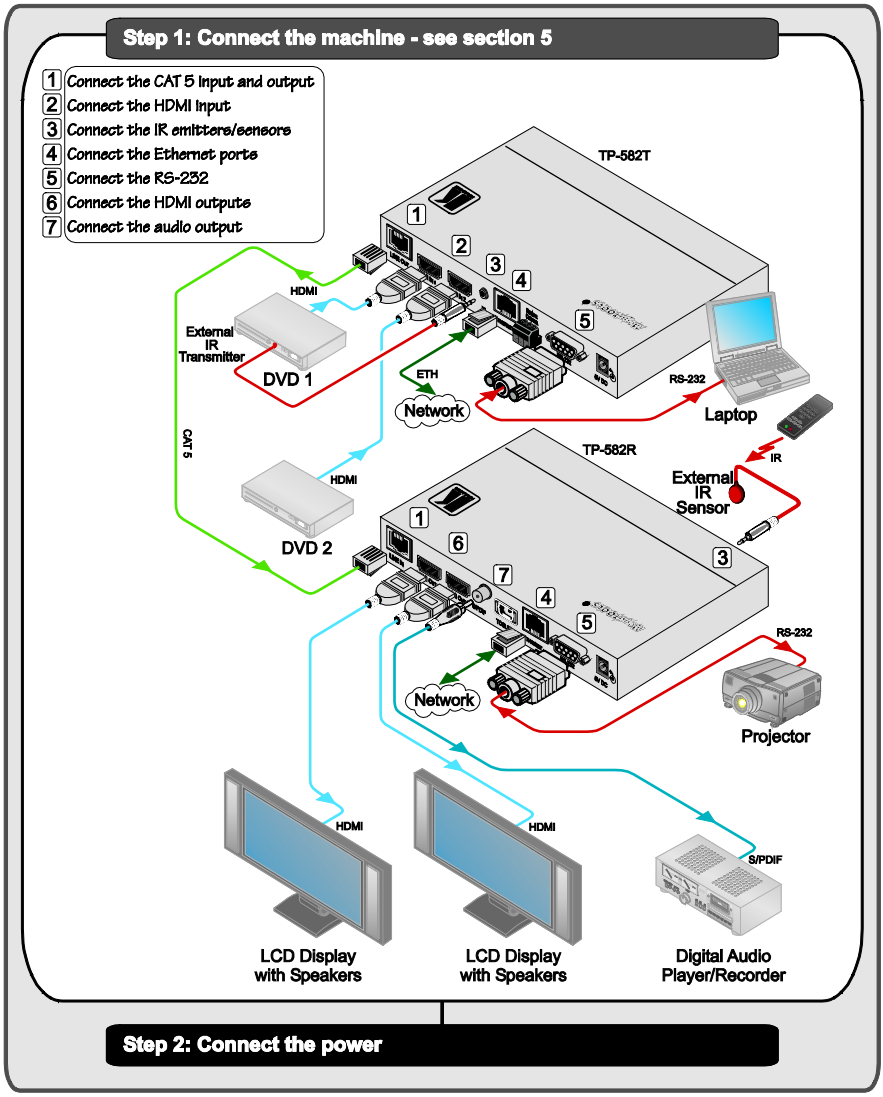
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download up-to-date Kramer user manuals from the Internet at http://www.kramerelectronics.com

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.



3 Overview

The **TP-582T** and **TP-582R** are a high-quality twisted pair transmitter and receiver for HDMI, 100BaseT Ethernet, bidirectional RS-232 and IR signals.
With the **TP-582T** you can select one of two HDMI inputs, and convert it with the 100BaseT Ethernet, RS-232 and IR input signals to a twisted pair signal. The **TP-582R** converts the twisted pair signal back to 100BaseT Ethernet, RS-232, IR and two HDMI outputs, and de-embeds the audio to S/PDIF and TOSLINK® audio outputs. The **TP-581T** is identical to the **TP-582T** but has only one HDMI input[1].

The twisted pair transmitter and receiver require shielded twisted pair (STP) cable. For optimum range and performance use Kramer's BC-DGKat524, BC-DGKat623 and BC-DGKat7a23 cables. Note that the transmission range depends on the signal resolution, graphics card and display used. The distance using non-Kramer CAT 5, CAT 6, and CAT 7 cables may not reach these ranges. Use only shielded cable where both ends of the shield are soldered to ground.

3.1 Features of the TP-581T, TP-582T and TP-582R

This transmitter/receiver pair features:

- Signals of up to 2.25Gbps (up to 1080p@60Hz 36 bit) over a range of up to 100 meters (330 feet) using Cat-5e or Cat6 cables and a system range of up to 130 meters (430 feet) using BC DGKat623 or BC-DGKat7a23
- HDTV compatibility
- HDMI support (V.1.4 with Deep Color, x.v.Color™, Lip Sync, HDMI Uncompressed Audio Channels, Dolby TrueHD, DTS-HD, CEC)
- 3D pass through
- HDCP compliance
- A bidirectional RS-232 interface over which commands and data can flow in both directions via the RS-232 interface at rates up to 115200, allowing status requests and control of the destination unit
- Bidirectional infrared interface for remote control of peripheral devices (see Section 5.3)
- 100BaseT Ethernet interface for connection to a network (see Section 3.3)

1 Since the TP-581T has only one input, it does not have the input selection control which the TP-582T has (that is, contact closure, IR and front panel input selection)

- LED status indicators for input, output, link and power
- Two RJ-45 CAT 5 output connectors: one for the line output and the other for the Ethernet input

The compact MegaTOOLS® enclosures (for the transmitters and the receiver) let you rack mount up to two units side-by-side in a 1U 19" rack space when using the optional **RK-T2B** rack.

In addition to the common features:

The **TP-582T** *HDMI Switcher/Line Transmitter* also features:

- Two HDMI inputs
- Momentary remote contact closure for input switching
- Front panel input select button
- IR remote control input switching (via the Kramer IR remote control transmitter)
- Front-panel input selection

The **TP-582R** *HDMI Line Receiver DA* also features:

- One RJ-45 CAT 5 input connector
- Two HDMI outputs
- An S/PDIF digital audio output
- A TOSLINK® optical audio output

The **TP-581T** HDMI Line Transmitter also features:

- One HDMI input

3.2 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[1] audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the highest high-definition image and sound quality.

In particular, HDMI[2]:

- Provides a simple[3] interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and video monitor, such as a digital flat LCD / plasma television (DTV), over a single lengthy[4] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[5] on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video quality via a single cable[6], and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play

HDMI has the capacity to support:

- Existing high-definition video formats (720p, 1080i, and 1080p/60), as well as standard definition formats such as NTSC or PAL

1 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

2 HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI licensing LLC

3 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

4 HDMI technology has been designed to use standard copper cable construction at up to 15m

5 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

6 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

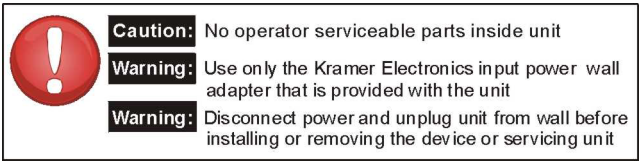
3.3 About HDBaseT™ Technology

HDBaseT™ is an advanced and inexpensive all-in-one connectivity technology[1]. It is particularly suitable in the consumer home environment as a digital home networking alternative where it enables you to replace numerous cables and connectors by a single LAN cable used to transmit uncompressed full high-definition video, audio, 100BaseT Ethernet, power over cable, as well as various control signals.

3.4 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Connect only good quality connection STP CAT 5 24 AWG cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise-levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your **TP-581T/TP-582T/TP-582R** away from moisture, excessive sunlight and dust


Caution: No operator serviceable parts inside unit
Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit
Warning: Disconnect power and unplug unit from wall before installing or removing the device or servicing unit

1 Supported by the HDBaseT Alliance

4 Your HDMI Line Transmitters/Receiver

This section describes the:

- **TP-581T** *HDMI Line Transmitter*, see Section 4.1
- **TP-582T** *HDMI Switcher/Line Transmitter*, see Section 4.2
- **TP-582R** *HDMI Line Receiver DA*, see Section 4.3

4.1 Your TP-581T HDMI Line Transmitter

Figure 1 and Table 1 define the **TP-581T**:

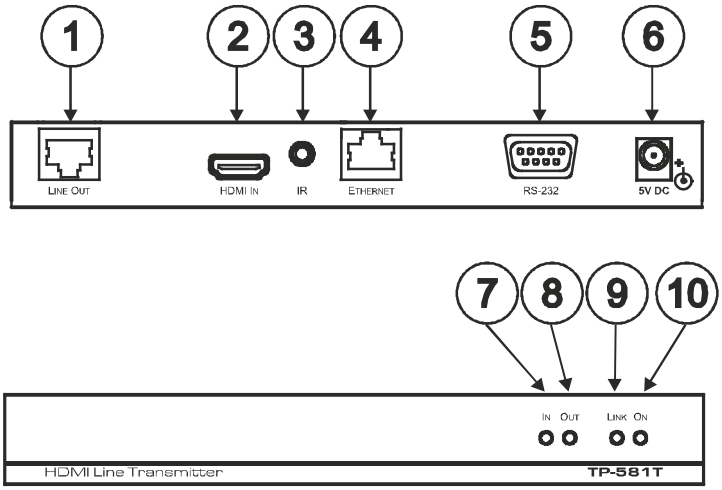


Figure 1: TP-581T HDMI Line Transmitter

Table 1: TP-581T HDMI Line Transmitter Features

#	Feature	Function
1	*LINE OUT* RJ-45 Connector	Connects to the CAT 5 IN RJ-45 connector on the **TP-582R**
2	*HDMI IN* Connector	Connects to the HDMI source
3	*IR* 3.5mm Mini Jack Connector	Connects to an external infrared transmitter / sensor (receiver)
4	*ETHERNET* Connector	Connects to a network
5	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 port
6	*5V DC*	+5V DC connector for powering the unit
7	*IN* LED	Lights when an HDMI input device is connected
8	*OUT* LED	Lights when an HDMI output device is detected
9	*LINK* LED	Lights when the TP connection is active
10	*ON* LED	Lights when receiving power

4.2 Your TP-582T HDMI Switcher/Line Transmitter

Figure 2 and Table 2 define the **TP-582T**:

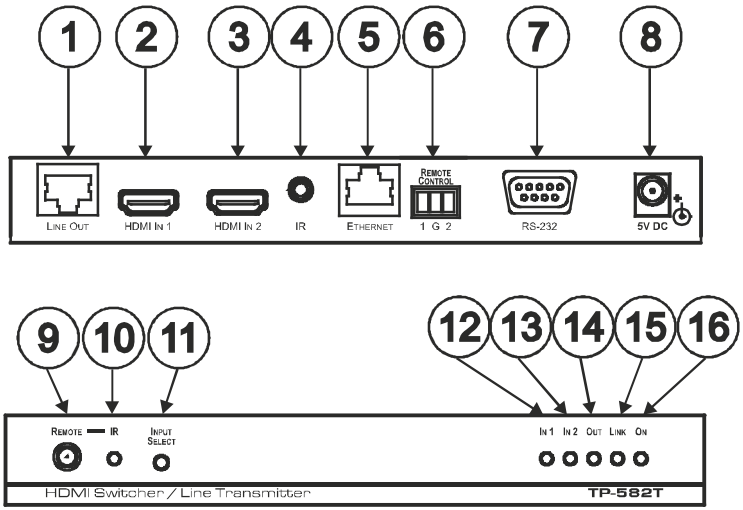


Figure 2: TP-582T HDMI Switcher/Line Transmitter

Table 2: TP-582T HDMI Switcher/Line Transmitter Features

#	Feature	Function
1	*LINE OUT* RJ-45 Connector	Connects to the CAT 5 IN RJ-45 connector on the **TP-582R**
2	*HDMI IN 1* Connector	Connects to the HDMI source 1
3	*HDMI IN 2* Connector	Connects to the HDMI source 2
4	*IR* 3.5mm Mini Jack Connector	Connects to an external infrared transmitter/sensor (receiver)
5	*ETHERNET* Connector	Connects to a network
6	*REMOTE CONTROL* Terminal Block	Connects to contact closure switches (see Section 5.4)
7	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 port
8	*5V DC*	+5V DC connector for powering the unit
9	*REMOTE* IR Sensor	Senses commands from the Kramer IR remote control device [1]
10	*IR* LED	Lights when an infrared signal is detected
11	*INPUT SELECT* Switch	Press to toggle between HDMI inputs
12	*IN 1* LED	Lights when the HDMI 1 input device is connected
13	*IN 2* LED	Lights when the HDMI 2 input device is connected
14	*OUT* LED	Lights when an HDMI output device is detected
15	*LINK* LED	Lights when the TP connection is active
16	*ON* LED	Lights when receiving power

1 Note that the IR sensor is only used to select the TP-582T inputs. These IR signals cannot be transmitted to the TP-582R

4.3 Your TP-582R HDMI Line Receiver DA

Figure 3 and Table 3 define the **TP-582R**:

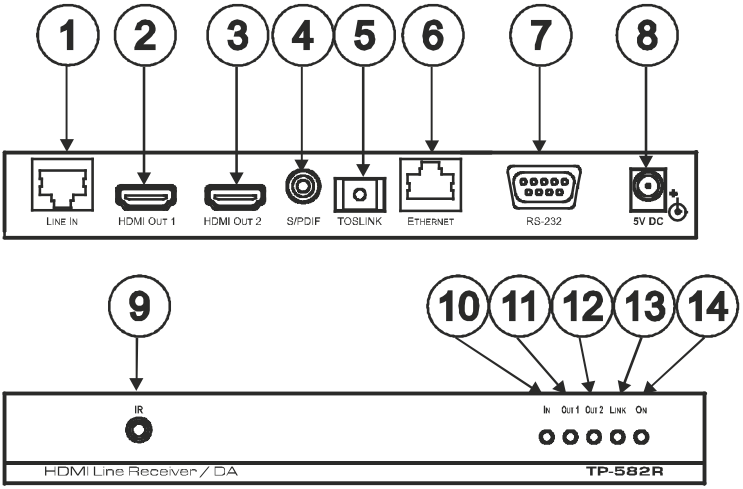


Figure 3: TP-582R HDMI Line Receiver DA

Table 3: TP-582R HDMI Switcher/Line Receiver Features

#	Feature	Function
1	*LINE IN* RJ-45 Connector	Connects to the CAT 5 OUT RJ-45 connector on the **TP-581T** or **TP-582T**
2	*HDMI OUT 1* Connector	Connects to the HDMI acceptor 1
3	*HDMI OUT 2* Connector	Connects to the HDMI acceptor 2
4	*S/PDIF* Connector	Connects to a digital audio acceptor
5	*TOSLINK*® Connector	Connects to an optical audio acceptor
6	*ETHERNET* Connector	Connects to a network
7	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 port
8	*5V DC*	+5V DC connector for powering the unit
9	*IR* 3.5mm Mini Jack Connector	Connects to an external infrared transmitter/sensor (receiver)
10	*IN* LED	Lights when an input device is connected
11	*OUT 1* LED	Lights when the HDMI 1 output device is connected
12	*OUT 2* LED	Lights when the HDMI 2 output device is connected
13	*LINK* LED	Lights when the TP connection is active
14	*ON* LED	Lights when receiving power

5 Connecting the TP-581T, TP-582T and TP-582R

You can use the **TP-581T** *HDMI Line Transmitter* or the **TP-582T** *HDMI Switcher/Line Transmitter* with the **TP-582R** *HDMI Line Receiver DA* to configure an HDMI transmitter/receiver system.

- To connect the **TP-582T** or **TP-581T**, see Section 5.1
- To connect the **TP-582R**, see section Section 5.2
- To remotely control the A/V equipment, see Section 5.3

5.1 Connecting the TP-582T or TP-581T

To connect the **TP-582T** or **TP-581T** as shown in the example in Figure 4, do the following:

1. Connect the HDMI IN1 connector to the first HDMI source[1] (for example, a DVD player 1) for the **TP-582T**.
2. Connect the HDMI IN2 connector to the second HDMI source[2] (for example, a DVD player 2).
3. Connect the ETHERNET RJ-45 connector to a network.
4. Connect the RS-232 9-pin D-sub connector to a computer.
5. Connect the IR 3.5mm mini jack to an IR emitter.
6. Connect the REMOTE CONTROL terminal block to an external set of switches (not shown in Figure 4).
7. Connect the LINE OUT RJ-45 connector over CAT 5 twisted pair to the **TP-582R** LINE IN connector.
8. Connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 4).

1 On the TP-581T, connect the HDMI IN connector to the HDMI source

2 There is no HDMI IN 2 connector for the TP-581T

5.2 Connecting the TP-582R

To connect the **TP-582R** as shown in the example in Figure 4, do the following:

1. Connect the HDMI OUT 1 connector to the first HDMI acceptor (for example, LCD display 1).
2. Connect the HDMI OUT 2 connector to the first HDMI acceptor (for example, LCD display 2).
3. Connect the ETHERNET RJ-45 connector to a network.
4. Connect the RS-232 9-pin D-sub connector to an RS-232 port (for example, a projector).
5. Connect the IR 3.5mm mini jack to an IR sensor.
6. Connect S/PDIF RCA connector to a digital audio acceptor (for example, a digital audio recorder).
7. Connect TOSLINK® connector to an optical audio acceptor (for example, a digital audio recorder) (not shown in Figure 4).
8. Connect the LINE IN RJ-45 connector over CAT 5 twisted pair to the **TP-581T** or **TP-582T** LINE OUT connector.
9. Connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 4).

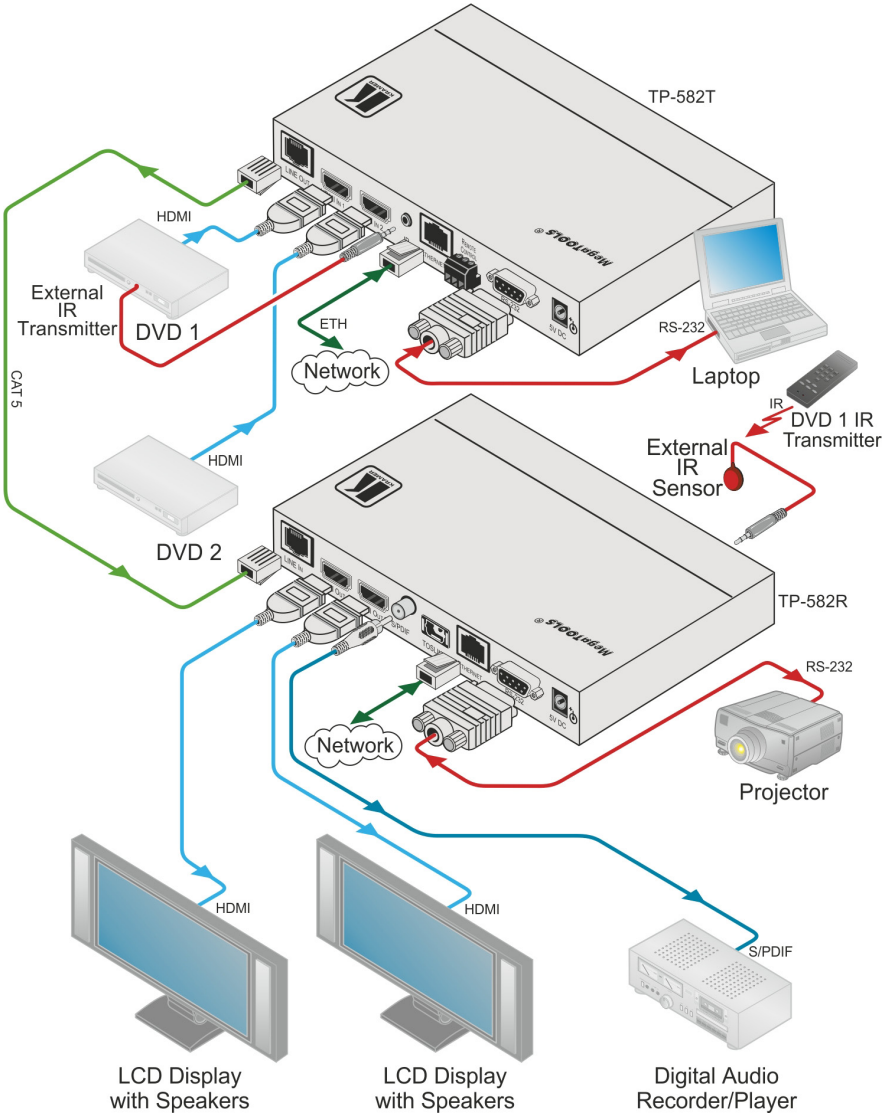


Figure 4: Connecting the TP-582T/TP-582R Transmitter/Receiver

5.3 Controlling the A/V Equipment via an IR Transmitter

Since the IR signal on the **TP-581T**/**TP-582T** and the **TP-582R** is bidirectional, you can use a remote control transmitter[1] to send commands (to the A/V equipment) from either end of the transmitter /Receiver system. To do so you have to use the Kramer external IR sensor[2] and the Kramer IR emitter cable[3].

Note that the IR sensor is only used to select the **TP-582T** inputs. These IR signals cannot be transmitted to the **TP-582R**.

Figure 5 illustrates how to control the DVD player using a remote control via the **TP-582R**.

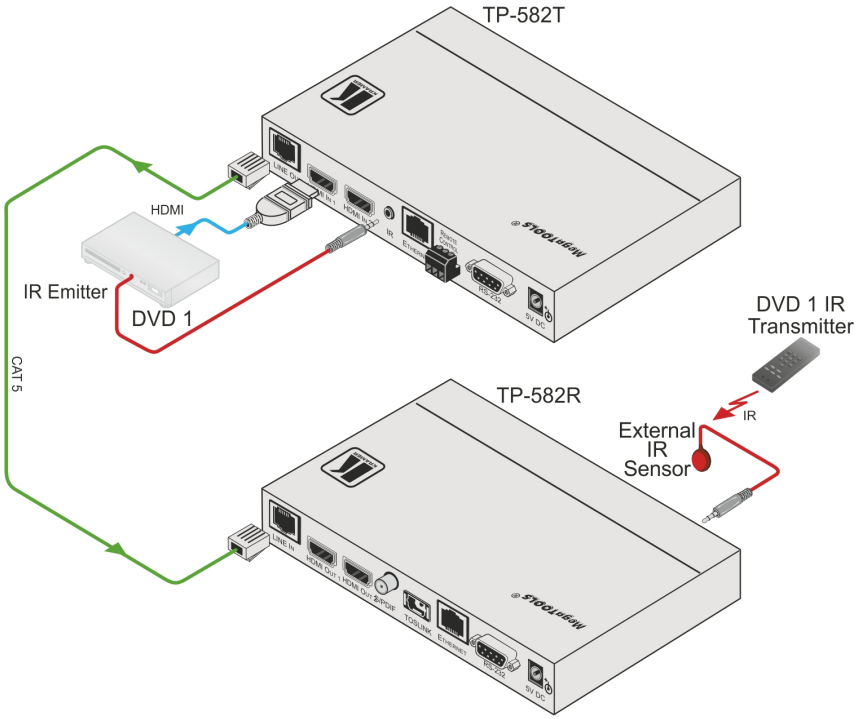


Figure 5: Controlling a DVD Player via the TP-582R

1 That is used for controlling a peripheral device (for example, a DVD player). The Kramer IR remote control transmitter supplied with the TP-582 is used to select the inputs of the machine

2 P/N: 95-0104050

3 P/N: C-A35/IRE-10; two IR Emitter Extension Cables are also available: a 15 meter cable and a 20 meter cable

Figure 6 illustrates how to control the LCD display via the **TP-581T/TP-582T**.

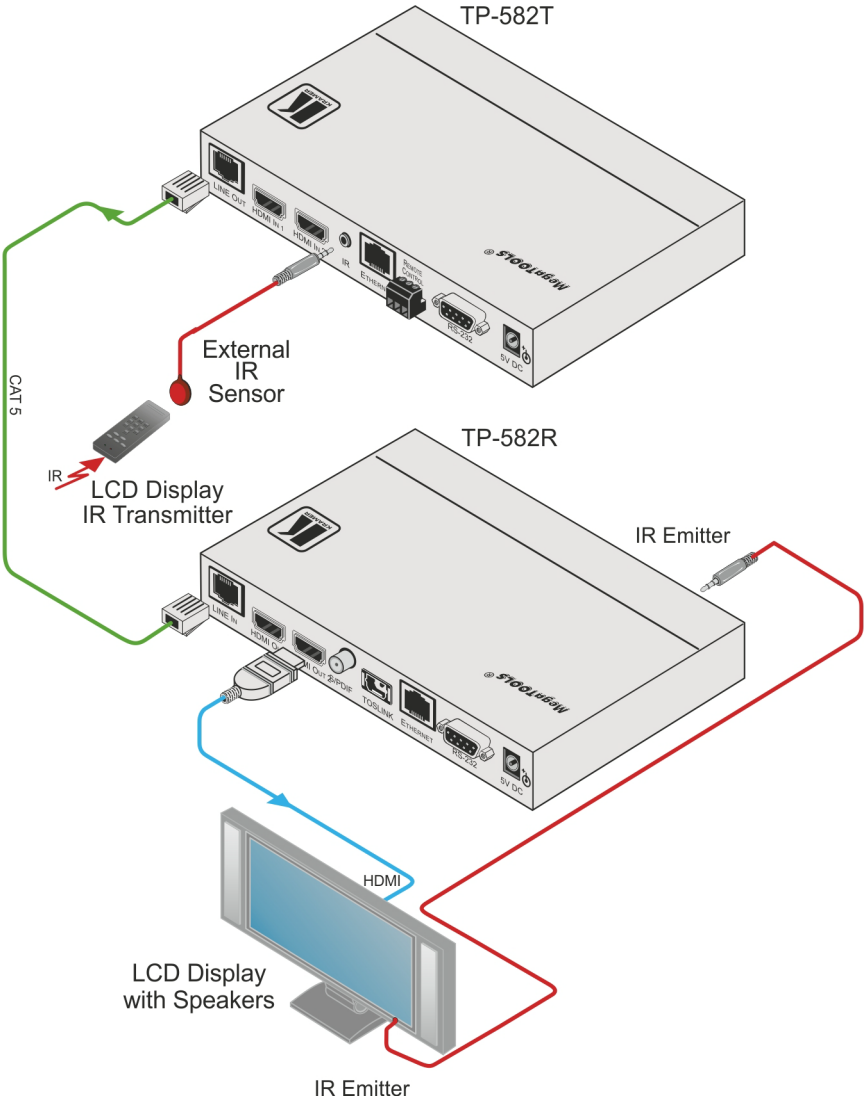


Figure 6: Controlling an LCD Display via the TP-582T

5.4 Controlling the TP-582T via the REMOTE Terminal Block Connector

The contact closure remote control pins operate in a similar way to the INPUT SELECT button. Using the contact closure remote control you can select the HDMI input. To do so, momentarily connect the required input pin (IN 1 or IN2) on the REMOTE CONTROL terminal block connector to the GND (Ground) pin, as Figure 7 illustrates.

Do not connect more than one PIN to the GND PIN at the same time.

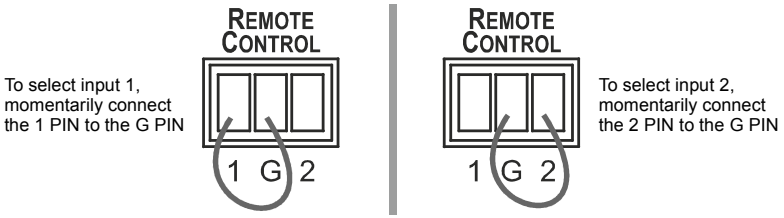

REMOTE CONTROL
To select input 1, momentarily connect the 1 PIN to the G PIN
1 G 2
REMOTE CONTROL
1 G 2
To select input 2, momentarily connect the 2 PIN to the G PIN

Figure 7: Connecting the Contact Closure Remote Control PINs

5.5 Connecting to a PC

You can connect to the transmitter/receiver system via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect via RS-232, connect the RS-232 9-pin D-sub rear panel port on the transmitter/receiver system unit via a 9-wire straight cable (pin 2 to pin 2, pin 3 to pin 3, pin 5 to pin 5) to the RS-232 9-pin D-sub port on your PC.

5.6 Wiring the CAT 5 LINE IN / LINE OUT RJ-45 Connectors

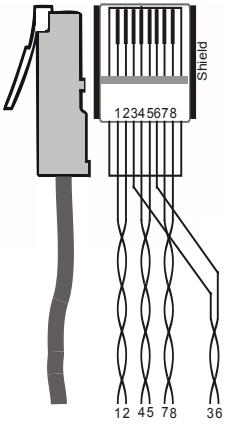
Table 4 and Figure 8 define the STP CAT 5 PINOUT[1], using a straight pin-to-pin cable with RJ-45 connectors (note, that the cable Ground shielding must be connected / soldered to the connector shield):

Table 4: CAT 5 PINOUT

EIA /TIA 568A	
PIN	**Wire Color**
1	Green / White
2	Green
3	Orange / White
4	Blue
5	Blue / White
6	Orange
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Figure 8: CAT 5 PINOUT



1 CAT 6 or similar (heavier gauge) cabling can also be used

6 Technical Specifications

Table 5 includes the technical specifications[1].

Table 5: Technical Specifications of the TP-581T, TP-582T and TP-582R

	TP-581T	TP-582T	TP-582R
INPUTS:	1 HDMI connector	2 HDMI connectors 1 remote contact closure on a terminal block connector	1 RJ-45 connector
OUTPUTS:	1 RJ-45 connector	1 RJ-45 connector	2 HDMI connectors 1 TOSLINK® optical audio 1 S/PDIF in an RCA connector
PORTS:	1 IR on a 3.5mm mini jack 1 Ethernet 100BaseT on an RJ-45 connector 1 RS-232 on a 9-pin D-sub connector	1 IR on a 3.5mm mini jack 1 Ethernet 100BaseT on an RJ-45 connector 1 RS-232 on a 9-pin D-sub connector	1 IR on a 3.5mm mini jack 1 Ethernet 100BaseT on an RJ-45 connector 1 RS-232 on a 9-pin D-sub connector
BANDWIDTH:	Supports up to 2.25Gbps bandwidth per graphic channel		
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI 1.3 and HDCP		
POWER SOURCE:	5V DC, 800mA	5V DC, 800mA	5V DC, 1.55A
DIMENSIONS:	18.8cm x 11.4cm x 2.4cm (7.4" x 4.5" x 1.0") W, D, H		
WEIGHT:	0.6kg (1.4lbs)		
ACCESSORIES:	Power supply		
OPTIONS:	RK-T2B 19” rack mount		

1 Specifications are subject to change without notice

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Kramer Electronics, Ltd.
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P/N: 2900-000582 REV 3